

Al^+ quantum-logic optical clock*

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We have constructed an optical clock that relies on quantum logic techniques to interrogate a single Aluminum ion with a systematic fractional-frequency uncertainty of 2.3×10^{-17} and long term instability below $3 \times 10^{-15}(\tau/s)^{-1/2}$. The dominant systematics are due to time dilation from secular motion and micromotion, and we present techniques to further suppress them. Stability limits for optical clocks whose probe time is limited by thermo-mechanical laser decoherence are explored.

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